

THE EMERGENCE, FEEDING HABITS, AND HOST
OF OPSEBIUS DILIGENS OSTEN SACKEN

(Diptera Acroceridae)

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Except for the report by Melander (1902) that the host of *Opsebius pterodontinus* Osten Sacken was *Agelenopsis naevia* (Walckenaer) (given as *Angelena naevia* Bosc.), biological information on this genus of acrocerids is wanting. Therefore the following notes may be of interest.

Immature female spiders of *Hololena curta* (McCook), were collected near Monrovia, Los Angeles County, California, on February 1, 1950. On March 20th at 10:02 p.m., while feeding this group of field-collected spiders, I noticed one individual spinning a web which resembled a protective moulting web, although the spider did not have the darkened appendages which are characteristic of the pre-moulting condition. The finished web completely surrounded the spider, which left just enough space on the inside for it to change its position. The spider then assumed this attitude: it placed its legs firmly upon the dorsal surface of the moulting web, with the ventral side of the abdomen facing upwards. It appeared nervous, making many jerking motions after which a swath of silk was added to the already heavily coated webbing.

At 10:44 p.m. the spider's abdomen dropped as if by an uncontrolled movement, and the spider then remained motionless for three minutes after which the parasitic larva emerged as follows: a very small hole appeared on the ventral surface of the spider's abdomen along the epigastric furrow, slightly to the left of the longitudinal median line. This hole then enlarged along the furrow, and the posterior part of the larva was seen to emerge. The larva remained colorless for a period of thirty seconds, at the end of which time fat bodies began to appear, and seemed to be pushed out in rhythmic motions. Large protuberances soon appeared as pseudopods bearing setae at their apices. Two rather long, dorsal, caudal spiracles appeared, disappeared and reappeared in an even respiratory count. These spiracles were visible for about twenty minutes at which time they seemed to disappear completely. The emergence of the larva seemed to be aided by the rhythmic contractions of its body, and during this period the visible portion of the larva protruding from the host noticeably increased in size.

The larva withdrew just enough to attach the posterior part of its body to the host's webbing, and then partially re-entered the host's abdomen. Four sets of setae were visible, each set divided into two rather distinct parts, and the posterior pair held the larva to the host's webbing. At 10:52 p.m. the head of the larva was partially visible through the integument of the spider, and could be seen feeding on the ventral abdominal surface. The host was apparently still alive as leg movements persisted.

At 11:03 p.m. the legs of the spider began to fold in towards its body, and since the abdomen was greatly shrunken the spider was assumed to be dead. The mouthparts of the larva were clearly seen invading the silk glands and other tissues along the ventral surface of the abdomen. The mouthparts were small (0.5 mm.), black, and heavily sclerotized. They evidently consisted of two major parts: a movable plate-like labrum, and a movable "U-shaped" mandible. While feeding on the ventral surface, the mouthparts seemed to move back and forth smoothly in an arc of about 2 mm. At 11:06 p.m. the external part of the larva measured 6 mm. in length and 3 mm. in width. The fifth set of setae was visible as the larva forced part of its body out, leaving the spider attached to the webbing by its left foreleg only.

At 11:12 p.m. the larval head was seen probing the tissues of spinnerets and this region was the site of intense feeding activity, with the larva entering and re-entering this tissue about eight times. While feeding, the mouthparts moved up and down at the rate of 2.5 movements per second. This rate continued, with little rest, throughout the entire feeding period. By 11:33 p.m., the normally brownish pigment of the spider's abdomen seemed to be almost white, with the exception of the spinnerets and the epigastrium. From 11:33 p.m. to 12:25 a.m. the larval head was seen invading tissues in the cephalothoracic region for the first time. After fifteen minutes of feeding on the nervous and other related tissues, it began ingesting the contents of the legs.

The following list of numbers refers to figure 1 and will show the sequence of feeding while in the cephalothoracic region: (2), (1), (2), (4), (8), (7), (6), (3). The feeding in the above areas was confined to coxal regions with only intermittent feeding along the margins of the sternum. Feeding in the following sequence, (3), (2), (9), (10), (4), (1), (6), (9), (7), (8), (4), (3), (2), (5), denotes complete evacuation of nearly all the tissue and total

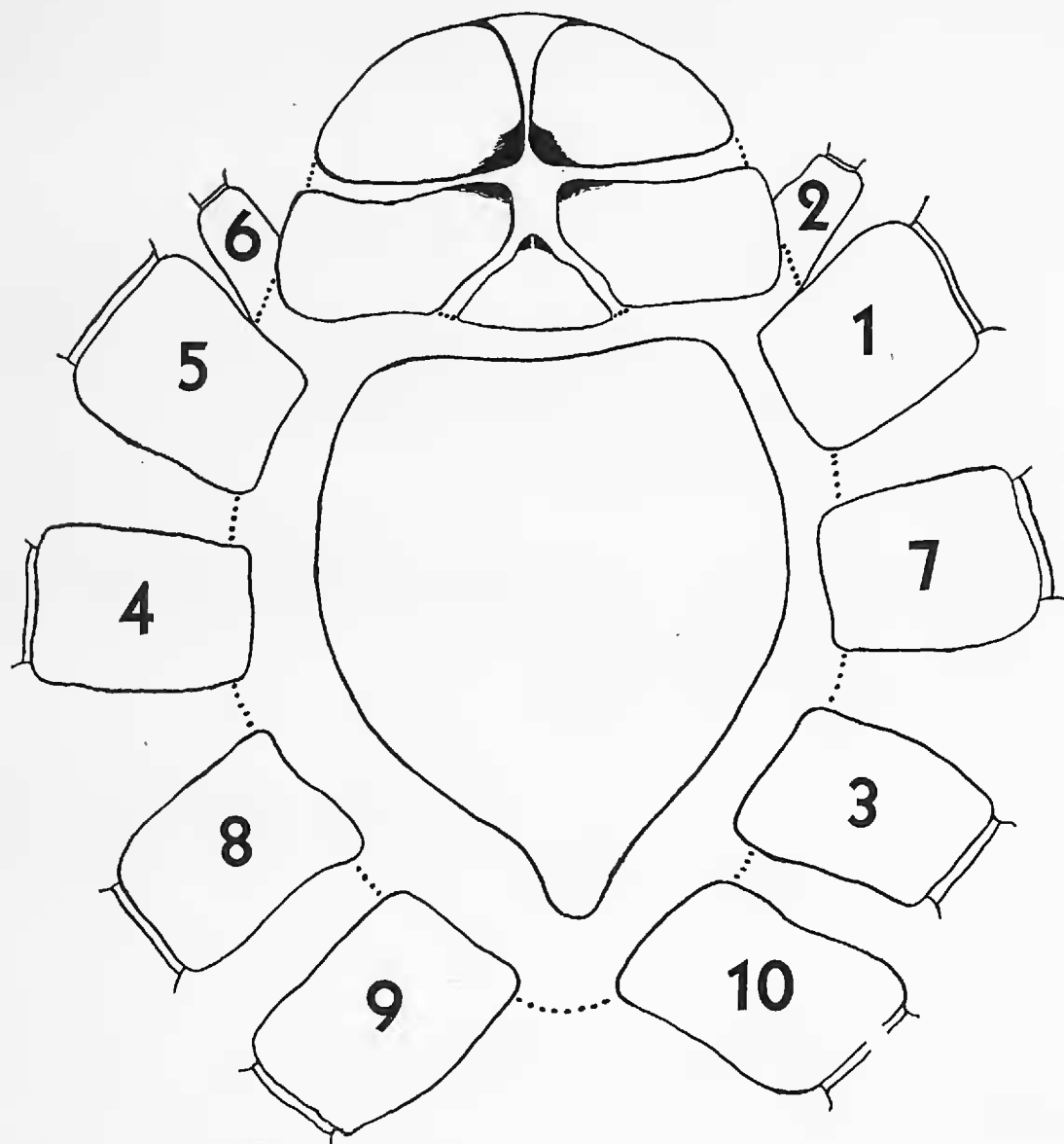


Fig. 1. Ventral sternal view (semidiagrammatic) of *Hololena curta* (McCook). Numbers refer to feeding sequence of parasite.

collapse of the trochanters, femora, and most of the tissues of the tibiae as well as the tissues of the pedipalps and chelicerae. This nearly complete collapse of the legs agrees with King (1916) who observed for *Pterodontia flavipes* Gray that, "the cephalothorax and legs were also eaten out so that the remains resembled a cast skin." This was in contrast to Kaston (1937), who observed for *Ogcodes pallidipennis* Loew¹ (given as *Ogcodes costatus* Loew) that "the cephalothorax and coxae were eaten out as well as the abdomen, but only the latter was shriveled."

The total time involved for cephalothoracic feeding apparently

¹According to Sabrosky (1944) *Ogcodes costatus* Loew is a synonym of *O. pallidipennis* Loew.

exceeded three hours, as my observations ended at 3:36 a.m. The total time used for external feeding probably exceeded five hours.

At 8:00 a.m., March 21st, the larva was found separated from the host and was adjusting itself to the protective webbing. All five sets of setae were fastened to the protective webbing and many small droplets, which were apparently exuded from the oral orifice, were seen on the webbing where the setae were attached, and also in places not adherent to the larva. During the day, the larva was observed many times stretching out and reaching a length which was about two times its original stationary length. The larva became motionless on March 22nd, and measured 6.5 mm. in length. On March 23rd, a rather long (7 mm., black coiled meconium appeared adhering to the caudal segment. On March 24th the larva pupated, the pupa being light brown and growing darker in color, until March 29th when the adult emerged. The parasite, a male, measured 4.5 mm. in length. The imago was then placed in a large cage (15" x 20" x 36") which was placed outside the laboratory under natural conditions. The specimen died April 29, 1950, thus showing an actual adult longevity of 30 days. The temperature and humidity conditions until the emergence had been fairly constant, the temperature being near 70° F., and the relative humidity near 60%. The temperatures under natural conditions varied from 45° F to 65° F with a relative humidity slightly lower than was recorded in the laboratory.

Another male *O. diligens* was reared from the same host species under the same conditions on April 21, 1950. This specimen died on May 29, 1950 (longevity 38 days).

Several other rearings of *O. diligens* from *Hololena curta* were obtained under extremely unfavorable conditions and gave the following longevity records:

- 1.) The host was collected near Davis, Yolo County, California, February 20, 1949. The larva emerged March 11th. The imago, a female, emerged March 24th and died April 3, 1949 (longevity 10 days).
- 2.) The host was collected at Davis, Yolo County, California, March 22, 1949. The larva emerged April 23rd. The imago, a female, emerged May 5th and died May 9, 1949 (longevity 4 days).
- 3.) The host was collected in the foothills near Monrovia, Los Angeles County, California, April 26, 1949. The larva emerged May 9th. The imago, a female, emerged May 20th and died May

29, 1949 (longevity 9 days).

4.) The host was collected in the foothills near Monrovia, Los Angeles County, California, April 26, 1949. The larva emerged May 17th. The imago, a male, emerged May 25th and died June 6, 1949 (longevity 12 days).

5.) The host was collected at Glendale, Los Angeles County, California, April 28, 1949. The larva emerged May 18th. The imago, a male, emerged May 26th and died June 11, 1949 (longevity 16 days).

The average longevity for these five specimens was 10 days. This short span was probably due to unfavorable rearing conditions.

SUMMARY

The emergence and external feeding of *Opsebius diligens* Osten Sacken on its host *Hololena curta* (McCook) is given in detail. The external feeding exhibited by this parasite is believed to be unique among parasitic Diptera. The formation of a protective web by the host spider prior to the emergence of the parasite is thought to be due to some sort of internal pressure applied by the internal larva in a specific region of the spider's body which in turn forces the production and spinning of the silk. This webbing serves as an excellent cocoon for the protection of the developing parasite. It was found that the host remained alive for nearly fifteen minutes after the emergence of the parasitic larva.

The total length of time observed for the external feeding of the larva was four hours and forty-nine minutes with five hours or more of actual feeding probably required.

The longevity of the two specimens reared under favorable conditions reached 30 and 38 days respectively. The longevity of the five specimens reared under unfavorable conditions averaged only 10 days.

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A THIRD MEXICAN SPECIES OF GENUCHINUS

(Coleoptera: Scarabaeidae)

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Genuchinus grandis Van Dyke, new species

Black, subopaque, feebly shining, without maculations and without conspicuous punctures above except on basal portion of scutellum. *Head* with front very minutely and sparsely, indistinctly punctured, the general surface alutaceous; clypeal margin broadly, evenly arcuate and reflexed, shining, feebly asperate laterally, and slightly elevated at middle. *Prothorax* narrowly constricted at apex, producing small right-angled front angles, sides diverging from front to middle, thence almost straight or feebly converging to the broadly rounded hind angles; base somewhat bilobed, side margin narrow in front, broader behind and continuing along the base but interrupted at middle; disc without impressions except a vague median longitudinal groove near base, practically impunctate, a few very minute, scattered punctures only observable. Scutellum large, somewhat depressed at base and coarsely punctured, acutely prolonged backwards and with a well-marked median longitudinal carina at apex. *Elytra* a third broader than prothorax and two and a fourth times as long; shoulders well rounded; sides feebly sinuate behind humeri, thence somewhat arcuate and a bit narrowed to well rounded apices; disc flat, subopaque or slightly shining with a few minute scattered punctures (only observable under high magnification) and with sides feebly wrinkled at middle third, pygidium with a few scattered shallow punctures; pro-pygidium finely and transversely rugose and with a small impression at middle of its hind margin. Undersurface: submentum large, transverse in front, rounded at sides, a bit pointed behind and with sides irregularly elevated; metasternum shallowly, umbilicately and irregularly punctured; all femora rather coarsely punctured, front tibia with a well defined tooth beyond middle of outer margin, and apex pointed and the four posterior tibiae each with a small, sharp spur at middle. Length 23 mm., breadth 9 mm.

Holotype, a unique specimen collected at LA MESA DE LA PUERCOS, 8,000 ft. alt., 12 miles west of YAHUALICA, JALISCO, MEXICO, Aug. 10, 1950, by Andrew Brown, and by him kindly presented to the California Academy of Sciences. This fine species differs from the two previously described Mexican species, *G. V-notatus* Westwood and *G. velutinus* Westwood, by being almost twice as large, of a uniform black color, more or less smooth above, without maculations and without conspicuous punctures above.